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DIGITAL PLATFORMS AND DATA-DRIVEN VALUE CREATION

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Abstract: Platforms, driven by digital technologies, enable companies to benefit from network effects and powerful ecosystems, providing economies of scale on the demand side in various industries. Platforms adopt different strategies to attract users and establish a sustainable business model, depending on the characteristics of the market in which they operate. They do not create value in themselves, it is the data that are the source of the value created, and the value itself is created at the end of the processing and their analysis. The purpose of the article is to synthesise knowledge about creating value based on data collected and used by digital platforms. To achieve the set goal, a method of analysing publications and source documents as well as sources available on websites was used. These data have value only when they are processed, analysed, and incorporated into the recommendation and prediction strategy. But they can contribute to this indirectly, facilitating access to markets and market spaces, generating revenue for members of the ecosystem, both partners and competitors and creating interconnections without which no transaction can take place. The article provides an academic viewpoint on the notion of digital platforms in the production of value, highlighting their ability to create novel insights and substantial implications for managerial strategies.

Keywords: data management, digital data, digital platform

JEL Classification: M16, O32

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Introduction

The digitisation of the economy has resulted in the proliferation of digital platforms and complex business ecosystems. The functioning of enterprises in the digital age forces the use of platforms and ecosystems to remain competitive and navigate the rapidly changing market conditions with skill. Therefore, the effective management of value co-creation within digital platform ecosystems is an essential aspect of company strategy in the contemporary digital age (Adner et al., 2019). We observe that the functioning of digital platforms is conducive to maximising network effects because they are powerful mechanisms for generating transactions. At the same time, digital platforms have profoundly transformed many different sectors (Essen et al., 2023; de Reuver et al., 2018). Platforms can operate on the so-called bilateral or multilateral markets, resulting from the cross network, where the activity can be free on one side of the market (for users) and paid on the other (e.g. for advertisers). They can find a salary in another market, such as the market for transferring personal data that will be used in the Big Data business (Rochet & Tirole, 2003). This work makes a contribution to the existing body of literature on digital strategy, platforms, and the scope of company's activities. The provided overview provides a comprehensive summary of the existing body of research pertaining to the concept of platform scope. This encompasses many dimensions such as technology, sponsor, and market scope. The review also emphasises the significance of making informed scope choices in the context of digital strategy and the generation of value within platform ecosystems. Innovation in services in the digital world accelerates using the broadly understood functioning of platforms (Lusch & Nambisan, 2015). However, digital platforms alone are not sufficient to achieve such user-driven growth. Having more users on the platform does not automatically result in more transactions. It may even turn out that too many users complicate the transaction; for example, if there are millions of products, people, or music tracks, it is necessary for the platform to provide efficient and even tailor-made search and sorting tools. The successful construction of such functionality largely depends on the platform's ability to use data to optimise these features. This requires that by the design phase, such a perspective is understandable and integrated into the operation of the platform. The generative characteristics of digital technologies contribute to the advancement of end-products and value propositions, while the digitalisation of information and data aggregation facilitate seamless connectivity and enhance the efficiency and effectiveness of interactions among various stakeholders. For instance, while generative smartphone operating systems facilitate the creation of several applications, the utilisation of data aggregation is crucial in promoting user acceptance. This is because data aggregation allows the platform sponsor to effectively connect consumers with the most suitable applications, taking into account their preferences and usage patterns (Murthy & Madhok, 2021). The platform analysis developed by Choudary (2021) provides a successful approach to understanding data issues in the platform model. Digital platform enterprises use digital technologies and connectivity to leverage and control digital assets that are outside the scope of the company's operations, creating value by facilitating connections between multiple parties, subject to reciprocal network effects (Gawer, 2021).

Operating systems for personal computers or smartphones are the most emblematic examples. Trading platforms bring together entities facilitating the matching of supply and demand (Moati, 2021, p. 9). Platforms specialise in data collection and rely on cross-financing – reducing the price of a product or service (or even offering it for free) in one part of the enterprise while raising prices in another part to compensate for losses (Srnicek, 2019, p. 73).

Literature review

Platforms are not a new concept and have existed for years (van Astyne et al., 2016; Zhu & Furr, 2016). The development of information and communication technologies has reduced the demand for classical physical infrastructure and assets (Vaska et al., 2021). These technologies facilitate the expansion of platforms, increase network effects, and enable the capture, analysis, and evaluation of huge amounts of data, increasing the value of the platform for all its participants (van Astyne et al., 2016). Scientists from various subdisciplines of management are increasingly using the term digital platform to describe a set of heterogeneous categories that show the features of platforms such as Facebook, Amazon, Apple, or Airbnb (de Reuver et al., 2018). The platform is a modern digital market in which products and services are exchanged on an unprecedented scale and with almost infinite choice (Bange & Derwisch, 2016). Amazon offers millions of products, Airbnb or Booking hundreds of thousands of rooms in almost every city in the world, and BlaBlaCar routes between almost every city in Europe. Consumers and producers exchange three things on the platform: information, goods or services, and units of value (Eychenne & Strong, 2017). Digital platforms do not produce data. They capture them through the intermediary function they perform in the market or markets. As intermediary platforms, they perfectly implement two main complementary objectives:

- Ensuring direct contact with its users.
- Attracting third-party services to its ecosystem.

In his book Platform Scale, Choudary (2015) proposes to present the platform as a set of three complementary layers that enable exchange and transactions (Figure 1). The transaction layer, that is, the exchange between different users of the platform, responds to the infrastructure layer that enables it. It also allows the platform to manage the data layer, which itself is the source of various services and functionalities of the platform. Each platform combines these three layers in different proportions to create value. The role is to attract participants to join, consummate matches between buyers and sellers, and facilitate value-creating exchanges by providing transactional architecture, and setting rules and standards based on data (Zhao et al., 2020). Therefore, this particular stream acknowledges the necessity of surpassing the platform provider and taking into account the relationships and engagements with stakeholders who have a significant impact on value generation across all three platform layers. The platform architecture layer consists of two segments; frontend and backend, which refer to the separation of concerns between the transactional layer (frontend) and data access layer (backend) (Pais et al., 2022). Nevertheless, although

the existing theoretical framework in the field of platform literature offers insights into the significance of cooperation and competition among value-creation partners for the prosperity of multi-sided platforms, it does not provide a comprehensive explanation for the emergence and evolution of sustainable multi-sided platforms in situations where competing platforms cater to the same user and complementor base. The literature does not provide an identification of the factors that determine the proportions of each individual layer. Each of these dimensions is part of all digital platforms, making the existence of such dimensions one of the most important distinguishing features of these platforms from other systems, such as information technology (IT) or information and communication technology (ICT) systems. Platforms provide value by reducing transaction costs and acting as intermediaries between economic operators, thus facilitating efficient interactions between parties (Evans & Schmalensee, 2017).

In some platforms, the data layer represents most of the value created by the platform: this is the case with advertising platforms such as DoubleClick Digital Marketing or Xandr.com, where most exchanges involve the exchange of data between publishers and advertisers and external data providers to improve the targeting of advertising campaigns. On the other hand, a platform such as OLX.pl uses data, but most of the value is related to the volume of ads placed by the platform users (Figure 1).

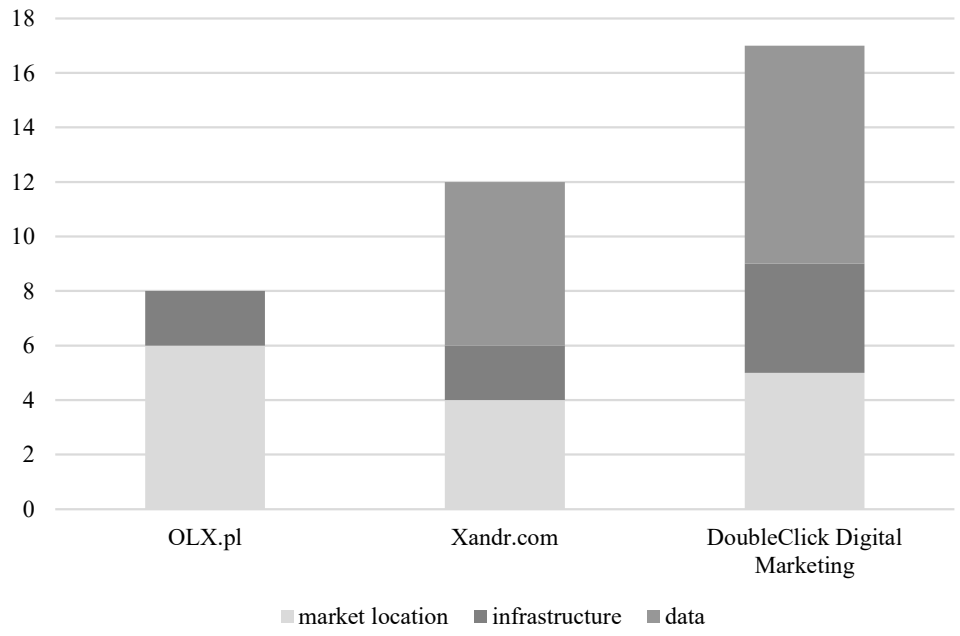

Figure 1. Data layer sise in sample platforms

Source: Author's own study

At the same time, this meaning changes over time if it is anticipated in the design phase of the platform. For example, a platform like Airbnb, in the startup phase, has little search and transaction data and, therefore, cannot rely on it to streamline its operations, such as personalising search results according to customer selection criteria in the past. If Airbnb has sufficient usage data, it is used to improve the results provided by the search engine and the rental pricing algorithm, which are the two main issues regarding the platform's liquidity and revenue. Therefore, the three-tier platform approach, with the data layer as the foundation, can be interpreted as a kind of data-driven business model. The ability of the platform to learn from data to continuously improve its products and services for each user (Gregory et al., 2021, p. 12). ICT technologies facilitate the development and expansion of platforms in a more straightforward and economical manner, improve network effects by streamlining participation, and allow for the collection, analysis, and assessment of large volumes of data, hence augmenting the platform's value for all users (van Astyne et al., 2016). In contrast to conventional enterprises that generate content, digital publishers (DPs) offer a platform that enables market players to exchange goods or services based on data (Gawer, 2021; van Astyne et al., 2016; Liu & Rong, 2015). These DPs' primary responsibility is to facilitate and mediate exchanges between market players in order to generate value for each and every one of them (Parker et al., 2016; Liu & Rong, 2015). According to Parker et al. (2016), a platform business is one that provides an open, participatory infrastructure and governance conditions to enable value-creating interactions between external producers and customers. More specifically, such business models are characterised by the fact that data is a key resource in the model and that digital devices generate usage data, as the Internet of Things (IoT) does on home devices or as connected medical devices do in healthcare.

Research methodology

The article uses a research methodology based on qualitative analysis. To achieve the set goal, a method of analysing publications and source documents as well as information available on websites was used. Based on the analysis of the literature on the subject, starting from the definition of the concept of platform, the approach to value creation by platforms has been characterised on the basis of the data obtained. The correct functioning of the platform ecosystem based on the concept of value creation within the platform ecosystem was presented. Network competitions were analysed through the prism of five strategies for increasing customer value and confronted with six-step value proposition phases. The platform must be data-driven, and have complete, consistent, relevant, and consolidated information about customers or users in real time. Thus, it was verified through the role of proper ecosystem structure and its elements.

The concept of value creation inside the platform ecosystem

When implementing strategic considerations, enterprises try to determine the scope of the value that the platform will bring: Does it enrich the current service

offer and complement its traditional activities? Defining the platform strategy also means asking what the company wants or needs to offer its customers additionally by using the possibilities of its ecosystem (suppliers, customers, sellers, partners, etc.). One company can implement several different platform strategies in parallel and combine them as needed. However, platformisation does not apply to all enterprises. From the customer's perspective, further strengthened using new technologies, several types of values can be distinguished that enrich the consumer experience: functional, monetary, informational, emotional, and social (Gonzalez et al., 2012).

Creating value on the platform also means creating real benefits for the recipient. Each platform must therefore consider how to transfer profits to its customers that reflect these real values, by saving time, limiting travel, and increasing the availability of services. Proposals in this regard must be very specific and allow both the reduction of costs and the proper use of the product, which must also fulfil the expected function. Commercial proposals must therefore correspond to the benefits – in the original sense of the word: doing good – that the customer can derive from them, and not only in the material dimension. Along with dematerialisation or rental, there is a new way to relieve the customer from maintaining and/or managing the product, which is very popular, especially among the young generation. If the offer is accompanied by a nonbinding clause in terms of duration (which allows for continuous improvement of services, constant freedom of choice and lower costs), this leads to an acceleration of the collaborative economy (Pastore-Reis, 2013).

The concept of value creation in the context of uncertainty. One of the primary difficulties that companies face when developing their digital strategy is the distinct challenge of creating unique value. This challenge arises when the central actor, such as the platform sponsor in the context of a digital platform ecosystem, collaborates with complementors to create value, but lacks prior knowledge of who these complementors are or the nature of their products. According to Tajedin et al. (2019), there is a belief that digital platform ecosystems can help mitigate risks by allowing the platform sponsor to utilise the market process in order to tap into the collective knowledge of external actors. This knowledge is then combined with the sponsor's own expertise and capabilities to generate value. The primary purpose of a value proposition is to encourage potential customers to discover and purchase a product or platform service. Therefore, it consists of convincing potential customers that the company's offer perfectly meets their needs or problems. It also supports brand communication to show the added value of the offer. More specifically, it justifies the existence and positioning of activities on the market. Be careful not to confuse a value proposition with a slogan or brand positioning.

For this to happen, the value proposition must be unique, clear, and short. It is a differentiating element that allows the platform to stand out not only from the customers but also from the competition. Network competition can be seen through the prism of five strategies for increasing customer value, i.e.: efficiency strategies, free benefits, complete solutions for the customer, unique benefits, and co-creation of value. It should be emphasised that these strategies can be implemented simultaneously, as they have been grouped at different levels (Doligalski, 2015).

The process of value co-creation commences with the platform sponsor, who assumes the role of the ecosystem's instigator. The sponsor is responsible for selecting the product and market space in which they wish to compete, as well as determining which aspects of the value creation process they will undertake. Concurrently, they grant complementors the opportunity to contribute to the remaining portions of the value creation process. The selection of a platform scope is a crucial aspect of digital strategy, as it significantly influences the ability to recruit and facilitate the participation of external actors, as well as manage the process of value co-creation inside the ecosystem (Murthy & Madhok, 2021).

The technological characteristics of platforms vary based on their specific type and intended use. In accordance with the study conducted by Cusumano et al. (2019), our research adopts their definition of platforms, which is based on their primary objective. The authors categorise digital platforms into two overarching groups which include transaction platforms and innovation platforms. The subsequent discussion provides a comprehensive examination of those two types of platforms and applies six value proposition phase based on those types. Digital platforms as transaction platforms – also known as multi-sided marketplaces or exchange platforms – have been the focus of much research. Their primary goal is to make transactions between various organizations, institutions, and people easier. Examples of these transactions include matching buyers and sellers, recruiters and job seekers, and drivers and passengers. During this period, a lot of new start-up business models that used internet-based applications to facilitate transactions between numerous parties in a market and make use of network effects came to be known by the name "platform". Platforms for transactions can be further categorised based on their main objective. We examine their materialities and potentialities as digital platforms to their basis for value creation and capture, and the resulting implications for development.

In the context of innovation platforms, scholarly literature commonly employs perspectives from innovation management and software engineering design (Gawer, 2021). Platforms are conceptualised as modular structures that consist of a core and peripheral, as proposed by Baldwin and Woodard (2009). These platforms are centrally regulated by a platform authority, as discussed by Wareham et al. (2014). The fundamental structure of a platform consists of many modules that can be accessed through interfaces. These modules are then joined by developers, also known as complementors, in order to create innovative applications and services. From an architectural standpoint, it can be observed that these applications and services are situated within the peripheral architecture of the innovation platform, as outlined by Tiwana (2014). This peripheral architecture is clearly distinguished and operates independently from the core architecture.

Based on those characteristics we distinguished 6 step value propositions that can be aligned with both types of platforms (Figure 2). It facilitates the purchase process of consumers, helping them see the value that the platform offers them. It is due to this that they will choose one brand instead of the other.

Adopting a broader perspective on value creation might facilitate the industry's efforts to contribute to the development by encouraging a platform-oriented mindset.

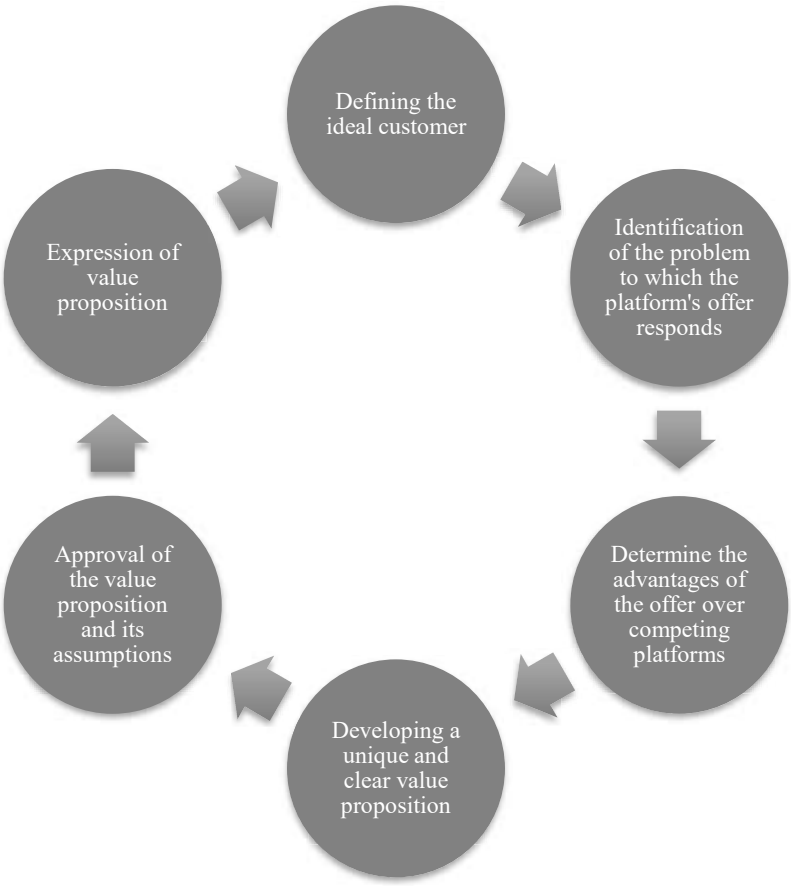

Figure 2. Six-step value propositioning phases

Source: Author's own elaboration

Data valuation strategies and platform liquidity management

The data collected feeds the platform and directly affects its liquidity management, increasing the value of transactions. The digital platform streamlines resources and increases resource density to facilitate efficient and effective exchange in the service ecosystem (Hein et al., 2019).

In platforms that implement a bilateral model, it is necessary to balance supply and demand and maintain a liquidity ratio that ensures the proper functioning of the platform, that is, the execution of transactions on the platform. If liquidity is a key issue for a real-time platform like Uber or Pyszne.pl. Liquidity is defined as the threshold at which the number of users allows the platform to function optimally. We distinguish between absolute and relative liquidity. For platforms where matching is not real-time, liquidity management includes the pace of search results, as well as optimising the pace of inventory utilisation. The Airbnb and Spotify cases illustrate this problem. Airbnb faces the challenge of converting visits into bookings.

So, they must strive to improve the results they present to visitors to their website or mobile application to maximise the likelihood of an increase in bookings. For this purpose, it largely uses the usage data produced by customers of the platform.

Companies that join the ecosystem usually have activities that are complementary to those of the leader or the central company and are guided by the principle of specialisation. The existence of products or services that are complementary (Brandenburger & Nalebuff, 1996) to the main offer of the node company promotes ecosystem growth through direct and/or indirect network externalities (see Figure 3) (Stremersch et al., 2007; Church et al., 2008; Church & Gandal, 1993; Katz & Shapiro, 1985; 1994; Matutes & Regibeau, 1988).

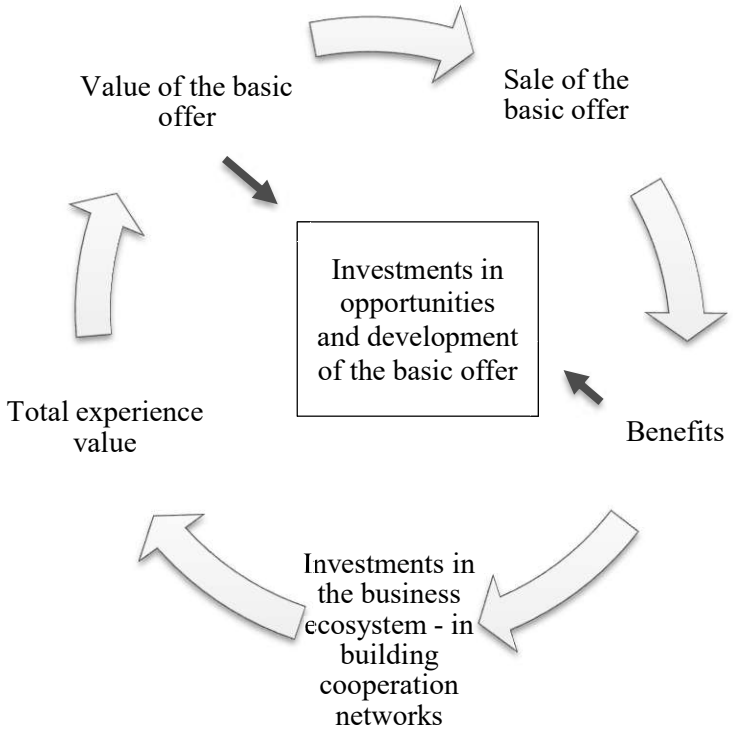

Figure 3. Proper functioning of the platform ecosystem

Source: Author's own study based on (Moore, 1996)

The development of business ecosystems is characterised by collective and "open" innovation involving several companies with varied and complementary skills. A comprehensive examination of the different phases within an ecosystem's life cycle reveals that the company that initiates an innovation will require allies who are likely to assist in the advancement and distribution of its novel product or service in a short period of time (Moore, 1996). As previously observed, platforms facilitate the utilization of indirect network externalities that aid in the formation of the proposition that the pivotal firm and its associates carry (refer to Figure 3). The platform

must be data-driven, and have complete, consistent, relevant, and consolidated information about customers or users in real time and about transactions. The research conducted by Moore (1996) regarding the various stages of ecosystem development aligns with the open innovation strategy proposed by Chesbrough (2003). This innovation strategy is specifically facilitated by information and communication technologies (ICTs) and platforms. The success and dominance of the platform depend (for the time being) on its ability to reach a critical mass of users (critical threshold). This property makes the activity conducted on the platforms very risky but also very attractive (Katz & Shapiro, 1994). The platform ecosystem must have the data to organise itself in a short cycle: to test growth relays or to produce new, groundbreaking business models. Without proper organisation and learning skills, attempts to use data often fail (Mithas et al., 2013). Moreover, given the very nature of Big Data methods, which are based on very large amounts of data and even on all available data on a given topic, it is necessary to combine thinking about value creation mechanisms and business models with thinking about technical and analytical capabilities, so that the design of offers and products adequately considers data collection. This raises the question of what skills should be combined and how they can be integrated into the enterprise. As Isaac (2018) noted, different resources and skills are required to build a strategic capacity to extract value from data and develop data-driven business models. The skills required are related to different levels of needs:

- Strategic: the ability to define models that integrate data as a central resource in the value creation process.
- Organisational: the ability to organise resources and competencies; and skills, through data management.
- Technical: ability to identify the most efficient technical platforms and resources.
- Managerial: ability to manage various resources and express ability to create value.

Data collected about users plays a key role in the platform economy. Indeed, an important function of many platforms is to offer the user relevant individualised "offers" on other levels, whether it is a partner for a transaction (for example, a consumer restaurant on the Pyszne.pl portal), a product on an e-commerce website, an application in an application store, content (an article in an online newspaper, a video on YouTube, etc.), an available driver (Uber) or relevant information on an information portal. It would be physically impossible for a user to go through all possible offers to choose the right one (Bacache-Beauvallet & Bourreau, 2022). For example, on an e-commerce platform like Amazon, there are almost 100 million products available for sale, while there are 2 million apps on the App Store and 13,000 partner restaurants on Pyszne.pl.

The platform must offer an impeccable quality of service that is constantly improved while ensuring trust around the data. The simplicity of the user interface is key: all complexity must be managed by the platform. For this to happen, it must be data-focused and have complete, consistent, relevant, and real-time information about customers or users of the platform.

The establishment of a central infrastructure, typically in the form of a digital platform, is crucial for facilitating the development of diverse modules or complementary components that enhance value. Platform sponsors use an ecosystem of autonomous external players, referred to as complementors, to collaboratively generate value without exercising direct hierarchical control (Jacobides et al., 2018). The platform sponsors assume the responsibility of coordinating and organizing the fundamental offerings and supplementary components into cohesive value propositions via digital platforms. The platform aggregates various technology tools that facilitate rapid development to test innovative business models or simply develop new ones. This ability to aggregate tools requires the platform to be open while ensuring safety and traceability.

Discussion

Based on the literature review, this article provides an academic view of the notion of digital platforms in the creation of value, highlighting their ability to create insights and substantial implications for managerial strategies. The concept of business ecosystems emphasises how important it is for businesses to build a wide network of partners in order to increase the value of their tangible and intangible assets and enable them to innovate more quickly and cheaply. The value creation approach, which considers the various inter-firm relationships (collaboration, competition, cooperation), business models, skills mobilised, built, and rebuilt (dynamic capabilities) through the innovation process, and the role of ICT (platforms), is a particularly intriguing grid for analysing collective innovation processes. In this way, the value creation phenomena and related behaviours are contextualised by the business ecosystems of platforms approach. Adopting a broader perspective on value creation might facilitate every industry's efforts to contribute to development by encouraging to adoption of a platform mindset. In addition, this study offers a classification that distinguishes between transactional and innovative platforms and consolidates their fundamental attributes to align them to six-step value propositioning phases and the rules to govern or grow their ecosystem.

Conclusions

The main goal of digital platforms is to mobilise users as resources, through cross effects and commercialisation of access, but also and above all through their interactions with these platforms, as well as through the mechanisms of their participation in the value chain (open innovation, crowdsourcing, co-production...). Digital platforms do not create value. They capture it from the data. These data have value only when they are processed, analysed, and incorporated into the recommendation and prediction strategy. But they can contribute to this indirectly, facilitating access to markets and market spaces, creating revenues for members of the ecosystem, both partners and competitors, and creating interconnections without which no transaction can take place. The data are the source of the value created and the value itself at the

end of the processing and analysis. In order to effectively establish a strategic capability for extracting value from data and other sources, it is important to possess a range of capabilities and resources at different levels. Success cannot be achieved until the strategic, organizational, technological, and management needs are adequately fulfilled. Between them, many complex and costly processing processes make it possible to transform raw data into directly useful information, either to draw up a detailed user profile or to increase the reliability of applications and operational and analytical algorithms (Big Data, artificial intelligence, etc.). Otherwise, the value is created directly or indirectly at each stage of the data lifecycle. The economic and business models of the platforms were built on this basic element, which is data. In conclusion, given the widespread use of digital technologies and the significant influence of platform ecosystems, it is imperative to examine diverse viewpoints in order to enhance our comprehension of the fundamental components and their various manifestations. Despite the significance of technology and economics-focused viewpoints, emerging insights on digital platform ecosystems have introduced fresh inquiries and potential avenues for exploring unresolved problems that were previously overlooked. This article presents a perspective on the concept of digital platforms in value creation, offering the potential to generate new insights and significant ramifications for managerial practices.

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PLATFORMY CYFROWE I TWORZENIE WARTOŚCI OPARTYCH NA DANYCH

Streszczenie: Platformy, napędzane przez technologie cyfrowe, umożliwiają firmom czerpanie korzyści z efektów sieciowych i potężnych ekosystemów, zapewniając korzyści skali po stronie popytu w różnych branżach. Platformy przyjmują różne strategie, aby przyciągnąć użytkowników i ustanowić zrównoważony model biznesowy, w zależności od charakterystyki rynku, na którym działają. Same w sobie nie tworzą wartości; to dane są źródłem tworzonej wartości, a sama wartość powstaje na końcu przeprowadzonego przetwarzania i ich analizy. Artykuł ma na celu syntezę wiedzy na temat tworzenia wartości opartych na danych gromadzonych i wykorzystywanych przez platformy cyfrowe. Do osiągnięcia postawionego celu zastosowano metodę analizy publikacji i dokumentów źródłowych oraz informacji dostępnych na stronach internetowych. Dane te mają wartość dopiero wtedy, gdy zostaną przetworzone, przeanalizowane i włączone do strategii rekomendacji i predykcji. Ale mogą przyczynić się do tego pośrednio, ułatwiając dostęp do rynków i przestrzeni rynkowych, tworząc przychody dla członków ekosystemu, zarówno partnerów, jak i konkurentów, oraz tworząc wzajemne powiązania, bez których żadna transakcja nie może mieć miejsca. W artykule przedstawiono akademicki punkt widzenia na temat platform cyfrowych w produkcji wartości, podkreślając ich zdolność do tworzenia nowych spostrzeżeń i istotnych implikacji dla strategii menedżerskich.

Słowa kluczowe: zarządzanie danymi, dane cyfrowe, platforma cyfrowa